

PATENT SPECIFICATION

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(54) METHOD OF AND APPARATUS FOR DEWATERING OF DISTILLERY WORT OR SPENT WASH

(71) I, ROBERT MORRIS KERR, of British Nationality, of Belgrave Road, Edinburgh, Scotland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the method of and apparatus for dewatering of distillery wort or spent wash produced in a process for the production of grain whisky to recover suspended solids and is an addition to my Application No. 22890/69 (Serial No. 1298070).

The recovered suspended solids are used in the production of animal foodstuffs.

In a known process for the production of grain whisky, grain and liquid are mashed in a mash tun to provide a mash composed of saccharified liquor (wort) and spent grain (draff). The wort is fermented to produce an alcoholic liquor which is distilled to produce whisky and a spent wash. Suspended solids in the wort and spent wash are removed by centrifugal filter means or evaporation.

The present invention provides a method of dewatering the spent wash and wort to recover suspended solids which is more economical than known methods.

My co-pending application No. 22890/69 (Serial No. 1,298,070), provides for a method of and apparatus for producing dreg meal from the suspended solids in distillery spent wash by feeding a thin layer of spent wash on to a continuously moving filter screen in the form of a continuous belt where it is gravity filtered and subjected to mechanical separation by applying a vacuum to a portion of the screen to draw off liquid leaving a random dispersion of solids on the screen which is then passed under at least one press roller to remove further liquid and the solids are removed from the screen.

In a process for the production of grain whisky, grain and liquid are mashed in a mashing tun to form a mash, the wort produced from the mashing tun is then

subjected to filtration where suspended solids are removed in the form of draff and dilute wort is recycled to the mashing tun while the stronger wort and solids contained therein, which forms the filtrate, are passed to fermentation and distillation plant where spirit (whisky) is removed, and spent wash from the distillation, which contains both suspended and dissolved solids, is subjected to further filtration where dreg meal (suspended solids) is removed and the filtered spent wash is passed to evaporation plant from which a concentrated syrup is obtained.

The draff, dreg meal and syrup so produced may be blended and dried to provide animal foodstuffs to a prescribed specification.

According to the invention a method of recovering suspended solids from distillery wort or spent wash produced in a process for the production of grain whisky comprises the steps of feeding a thin layer of spent wash or wort containing suspended solids on to a substantially horizontal surface of a continuously moving filter screen in the form of a continuous band, filtering a major portion of the liquid content of the spent wash or wort by gravity through the screen leaving a random dispersion of solids on the screen, applying a vacuum at a fixed point to a portion of the area traversed by the moving screen to draw off further liquid, passing the screen with the solids thereon past at least one roller member which removes further liquid from the solids and removes the solids from the screen by adhesion to the roller member or members and subsequently ejecting the solids from the roller member or members into a hopper by centrifugal force as the solids build up on the roller member or members.

According to a further aspect of the invention apparatus for performing a method of recovering suspended solids from distillery wort or spent wash comprises a continuous belt filter screen having a substantially horizontal surface, means for

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continuously moving said screen, means for feeding spent wash or wort in a thin layer on to said surface of the screen, a filtrate chamber located below a first portion of said surface of the screen to receive filtrate by initial gravity filtration through said screen, means for separating further liquid from a random dispersion of solids left on the screen after said initial filtration including a vacuum chamber extending along a subsequent portion of said surface of the screen, and at least one pick-up roller engageable with and rotatable by said moving screen, said pick-up roller or rollers being adapted to press and pick-up the random dispersion of solids from said screen and to discharge the solids pick-up by centrifugal force into hopper means adjacent to said pick-up roller or rollers.

Embodiments of the invention will be described with reference to the accompanying drawings in which:—

Fig. 1 is a diagrammatic illustration of the process for the production of grain whisky showing the location of filtering steps in the process according to the invention;

Fig. 2 is a diagrammatic illustration of one embodiment of the apparatus used in the filtering process;

Fig. 3 is a diagrammatic illustration of another embodiment of the filtering apparatus.

Referring to Fig. 1 of the drawings in a process for the production of grain whisky, grain and liquid are mashed in a mashing tun M and the resulting mash is fed to a filtering station F where dilute wort is recycled to the mashing tun and part of the suspended solids (draff) are extracted by the filter.

The stronger wort, which contains suspended solids which pass through the filter station, is fermented then passed to distillation plant D where the spirit (whisky) is produced and spent wash from the distillation is fed to a further filtration station F₁ where suspended solids (dreg meal) are filtered from the wash. The filtered wash is then passed to evaporation plant E where a concentrated syrup is obtained.

The products from the process *i.e.* draff, dreg meal and syrup may be blended and dried to provide animal foodstuffs to a prescribed specification.

Fig. 2 illustrates diagrammatically the filtration apparatus used in stations F and F₁ and comprises a filter screen 1 in the form of a continuous belt, which is continually moved by drive means 2, such as rollers and pulleys.

Wort from the mashing tun M or spent wash from the distillation plant D is fed on to the substantially horizontal surface of the filter screen 1 at the respective filtration stations F or F₁, which filter screens traverse their respective stations at a speed of

several hundreds of feet per minute so that a major portion of the liquid filters freely by gravity through the screens into a filtrate chamber 3 leaving thereon random dispersions of solids. Further dewatering of the solids on the screen is obtained by passing the screen through at least one vacuum station 4 arranged below the screen 1.

The screen then passes press rollers 5 which are rotated by the moving screen.

The rollers 5 remove further liquid from the solids and at the same time remove the solids from the screen by adhesion to the rollers 5.

The rollers 5 may also be movable transversely to and fro across the moving screen as they are rotated by the screen.

As the solids become transferred from the screen 1 to the rollers 5 the thickness of the solids on each roller increases to an extent where the deposition becomes mechanically unstable, and is removed from each roller by centrifugal force and ejected into a hopper 6 where it is removed as by screw or other mechanical conveyor means.

Referring to Fig. 3 which illustrates an alternative embodiment of the invention it will be seen that the spent wash or wort is fed on to the substantially horizontal inner surface of the belt filter 1 and the rollers 5 are located within an area surrounded by the filter so that any solids filtered from the spent wash or wort fall back on to the screen if not removed by the rollers 5 and are thereby isolated from the filtrate. The hopper 6 is located below the rollers 5 within the area surrounded by the filter screen 1 and the vacuum chamber 4 is located adjacent the filtrate chamber 3 on the side of the screen opposite that surface on to which the unfiltered wort or spent wash is discharged.

WHAT I CLAIM IS:—

1. A method of recovering suspended solids from distillery wort or spent wash produced in a process for the production of grain whisky comprising the steps of feeding a thin layer of spent wash or wort containing suspended solids on to a substantially horizontal surface of a continuously moving filter screen in the form of a continuous band, filtering a major portion of the liquid content of the spent wash or wort by gravity through the screen leaving a random dispersion of solids on the screen, applying a vacuum at a fixed point to a portion of the area traversed by the moving screen to draw off further liquid, passing the screen with the solids thereon past at least one roller member which removes further liquid from the solids and removes the solids from the screen by adhesion to the roller member or members and subsequently ejecting

the solids from the roller member or members into a hopper by centrifugal force as the solids build up on the roller member or members.

- 5 2. A method of making grain whisky in which solids in wort discharged from a mash tun and spent wash discharged from distillation plant are removed by the steps of claim 1.
- 10 3. A method as claimed in claim 1 or 2 in which the roller member or members are moved laterally to and fro across the screen while rotating.
- 15 4. Apparatus for performing the method as claimed in claims 1 or 2 comprising a continuous belt filter screen having a substantially horizontal surface, means for continuously moving said screen, means for feeding spent wash or wort in a thin layer on
- 20 to said surface of the screen, a filtrate chamber located below a first portion of said surface of the screen to receive filtrate by initial gravity filtration through said screen, means for separating further liquid from a
- 25 random dispersion of solids left on the screen after said initial filtration including a vacuum chamber extending along a subsequent portion of said surface of the

screen, and at least one pick-up roller engageable with and rotatable by said moving screen, said pick-up roller or rollers 30 being adapted to press and pick-up the random dispersion of solids from said screen and to discharge the solids picked-up, by centrifugal force into hopper means adjacent to said pick-up roller or rollers. 35

5. Apparatus as claimed in claim 4 for performing the method as claimed in claim 3 in which the pick-up roller or rollers are movable laterally to and fro across the screen while being rotated. 40

6. A method of recovering suspended solids from distillery wort or spent wash according to claim 1 substantially as hereinbefore described.

7. Apparatus for recovering suspended 45 solids from distillery wort or spent wash according to claim 4 substantially as hereinbefore described with reference to the accompanying drawings.

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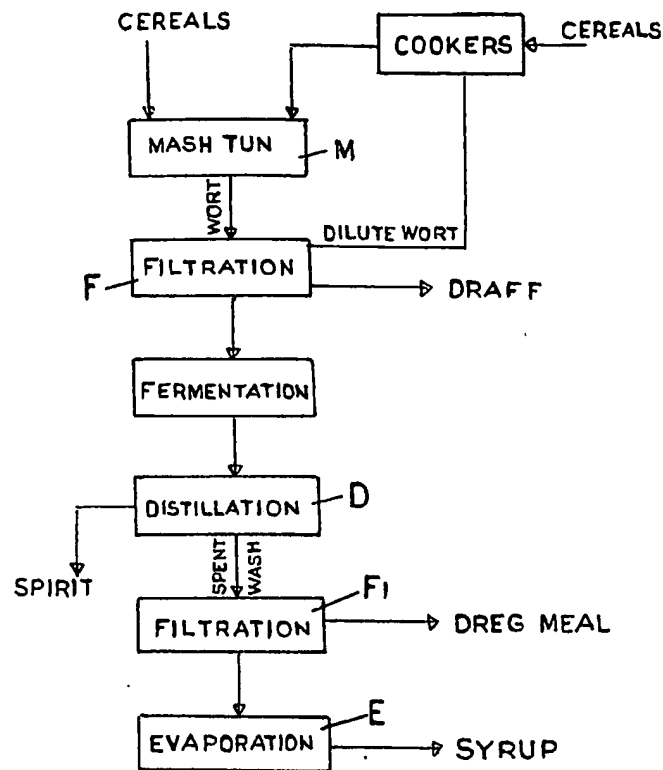


FIG.1

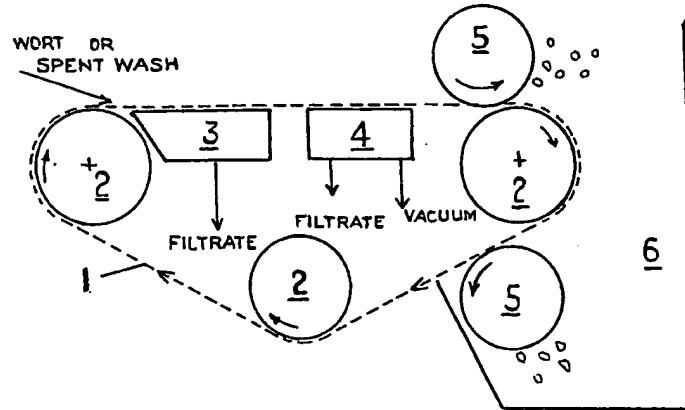


FIG. 2

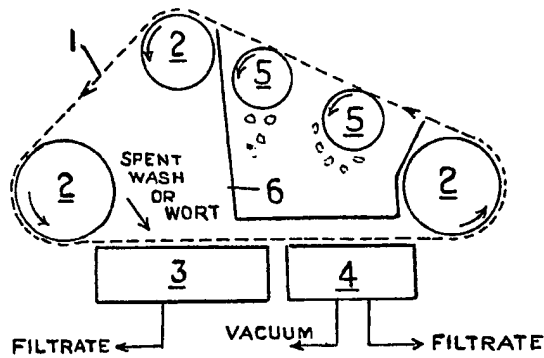


FIG. 3